

EXTENDABLE SELF-CONTAINED CLEANING DEVICE

BACKGROUND

- [0001] The present invention concerns cleaning devices, and more particularly relates to extendable cleaning devices.
- [0002] Cleaning devices are used extensively to clean vehicles, building exteriors and interiors, floors, windows or any other surface that needs to be cleaned. The cleaning devices are typically used with various cleaning fluids. For example, water, a combination of soap and water, windshield wiper fluid and other fluids can be placed or sprayed onto the surface to be cleaned to assist in the cleaning.
- [0003] Accordingly, an improved cleaning device is desired.

SUMMARY OF THE PRESENT INVENTION

- [0004] An aspect of the present invention is to provide a cleaning device comprising an extendable wand and a cleaning fluid delivery system. The extendable wand has a first end and a second end, with the extendable wand comprising a cleaning fluid reservoir located at the first end thereof and a cleaning head located at the second end thereof. The cleaning fluid delivery system is at least partially located within the extendable wand for delivering cleaning fluid in the fluid reservoir to the second end of the extendable wand. Pressure of the cleaning fluid within the cleaning fluid delivery system is independent of an extendable length of the extendable wand.
- [0005] Another aspect of the present invention is to provide a cleaning device comprising an extendable wand having a first end and a second end. The extendable wand is adjustable between a first length and a second length. The extendable wand comprises a cleaning fluid reservoir located at the first end of the extendable wand and being configured to accept cleaning fluid therein. The extendable wand further comprises a cleaning head connected to the second end of the extendable wand. The cleaning device also includes a coiled tube located within the extendable wand for delivering cleaning fluid in the cleaning fluid reservoir to the

second end of the extendable wand. The cleaning device further includes a pump located at the first end of the extendable wand for forcing the cleaning fluid from the cleaning fluid reservoir to the second end of the extendable wand through the coiled tube. The cleaning fluid in the coiled tube is at a first pressure when the extendable wand is at the first length and the cleaning fluid in the coiled tube is at a second pressure when the extendable wand is at the second length. The first pressure is identical to the second pressure.

[0006] Yet another aspect of the present invention is to provide a cleaning device comprising an extendable wand and a cleaning fluid delivery system. The extendable wand has a first end and a second end. The extendable wand comprises a cleaning fluid reservoir located at the first end thereof and a sprayer located at the second end thereof. The cleaning fluid delivery system is at least partially located within the extendable wand for delivering cleaning fluid in the fluid reservoir to the sprayer at the second end of the extendable wand. Pressure of the cleaning fluid within the cleaning fluid delivery system is independent of an extendable length of the extendable wand.

[0007] The principal objects of the present invention include providing a cleaning device having an easy to use supply of cleaning fluid. The cleaning device is efficient in use, economical to manufacture, capable of a long operable life, and particularly adapted for the proposed use.

[0008] Other objects, advantages and features of the invention will become apparent upon consideration of the following detailed description, when taken in conjunction with the accompanying drawings. The above brief description sets forth rather broadly the more important features of the present disclosure so that the detailed description that follows may be better understood, and so that the present contributions to the art may be better appreciated. There are, of course, additional features of the disclosure that will be described hereinafter which will form the subject matter of the claims appended hereto.

[0009] In this respect, before explaining the preferred embodiment of the disclosure in detail, it is to be understood that the disclosure is not limited in its application to the details of the construction and the arrangements set forth in the following description or illustrated in the drawings. The cleaning device of the present disclosure is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the

phraseology and terminology employed herein are for description and not limitation. Where specific dimensional and material specifications have been included or omitted from the specification or the claims, or both, it is to be understood that the same are not to be incorporated into the appended claims.

[0010] As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be used as a basis for designing other structures, methods, and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims are regarded as including such equivalent constructions as far as they do not depart from the spirit and scope of the present invention.

[0011] Further, the purpose of the Abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers and practitioners in the art who are not familiar with the patent or legal terms of phraseology, to learn quickly from a cursory inspection the nature and essence of the technical disclosure of the application. Accordingly, the Abstract is intended to define neither the invention nor the application, which is only measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

[0012] These and other objects, along with the various features and structures that characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the cleaning device of the present disclosure, its advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described the preferred embodiments of the invention.

[0013] While embodiments of the cleaning device are herein illustrated and described, it is to be appreciated that various changes, rearrangements and modifications may be made therein, without departing from the scope of the invention as defined by the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0014] Fig. 1 is a perspective view of a cleaning device according to the present invention in an extended position.

- [0015] Fig. 2 is a perspective view of the cleaning device according to the present invention in a retracted position.
- [0016] Figs. 3A and 3B are a bottom view of the cleaning device according to the present invention.
- [0017] Figs. 4A, 4B and 4C are a cross-sectional view of the cleaning device according to the present invention taken along the line IV-IV of Figs. 3A and 3B.
- [0018] Fig. 5 is an exploded view of a handle and a pump according to the present invention.
- [0019] Fig. 6 is a top isometric view of a main body of the handle according to the present invention.
- [0020] Fig. 7 is a first cross-sectional view of the main body of the handle according to the present invention taken along line VII-VII of Fig. 6.
- [0021] Fig. 7A is an enlarged view of the main body of the present invention taken from area 7A of Fig. 7.
- [0022] Fig. 8 is an isometric view of a pump handle of the handle according to the present invention.
- [0023] Fig. 9 is an isometric view of a valve insert sleeve of the pump according to the present invention.
- [0024] Fig. 10 is an isometric cross-sectional view of the valve insert sleeve of the pump according to the present invention.
- [0025] Fig. 11 is an isometric view of a valve insert of the pump according to the present invention.
- [0026] Fig. 12 is an isometric cross-sectional view of the valve insert of the pump according to the present invention.
- [0027] Fig. 13 is a cross-sectional view of a seal of the pump according to the present invention taken along line XIII-XIII of Fig. 5.
- [0028] Fig. 14 is an isometric view of a seal adapter of the pump according to the present invention.
- [0029] Fig. 15 is a rear view of the seal adapter of the pump according to the present invention.

- [0030] Fig. 16 is a second cross-sectional view of the seal adapter of the pump according to the present invention taken along line XVI-XVI of Fig. 15.
- [0031] Fig. 17 is an exploded view of a sprayer and a cleaning head according to the present invention.
- [0032] Fig. 18 is a first cross-sectional view of a sprayer body according to the present invention taken along line XIII-XIII of Fig. 17.
- [0033] Fig. 19 is a cross-sectional view of a check valve of the sprayer according to the present invention taken along line XIX-XIX of Fig. 17.
- [0034] Fig. 19A is a cross-sectional view of a second embodiment of the check valve of the sprayer according to the present invention.
- [0035] Fig. 20 is a cross-sectional view of a spray pattern adjuster knob of the sprayer according to the present invention taken along line XX-XX of Fig. 17.
- [0036] Fig. 21 is an isometric view of a yoke of the cleaning head according to the present invention.
- [0037] Fig. 22 is a top isometric view of a pivot of the cleaning head according to the present invention.
- [0038] Fig. 23 is a top isometric view of a mop head of the cleaning head according to the present invention.
- [0039] Fig. 24 is a bottom isometric view of the mop head of the cleaning head according to the present invention.
- [0040] Fig. 25 is a top isometric view of a cloth retainer of the cleaning head according to the present invention.
- [0041] Fig. 26 is a bottom isometric view of the cloth retainer of the cleaning head according to the present invention.
- [0042] Fig. 27 is an isometric view of an ice scraper of a second embodiment of the cleaning head according to the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

- [0043] For purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the invention

as orientated in Fig. 1. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0044] The reference number 10 (Figs. 1-4) generally designates a cleaning device embodying the present invention. In the illustrated example, the cleaning device 10 comprises an extendable wand 12 and a cleaning fluid delivery system 14 (see Figs. 4A-4C). The extendable wand 12 has a first end 16 and a second end 18, with the extendable wand 12 comprising a cleaning fluid reservoir 20 located at the first end 16 thereof and a cleaning head 22 located at the second end 18 thereof. The cleaning fluid delivery system 14 is at least partially located within the extendable wand 12 for delivering cleaning fluid in the cleaning fluid reservoir 20 to the second end 18 of the extendable wand 12. Pressure of the cleaning fluid within the cleaning fluid delivery system 14 is independent of an extendable length of the extendable wand 12.

[0045] In the illustrated example, the cleaning device 10 can be expanded between a fully extended position (Fig. 1) and a fully retracted position (Fig. 2). The extendable wand 12 of the cleaning device 10 includes a pair of telescoping tubes 24 that can telescope into and out of each other to move the cleaning device 10 to the fully extended position, the fully retracted position or any position therebetween. In the illustrated embodiment, the extendable wand 12 of the cleaning device 10 includes a handle 26. The pair of telescoping tubes 24 include a first telescoping end 32 and a second telescoping end 34, with the handle 26 being connected to the pair of telescoping tubes 24 at the first telescoping end 32. In the illustrated embodiment, the cleaning fluid delivery system 14 includes a pump 28 that forces the cleaning fluid from the cleaning fluid reservoir 20 to the second end 18 of the extendable wand 12. In the illustrated example, the pump 28 of the cleaning fluid delivery system 14 is located in the handle 26 of the extendable wand 12. Preferably, the extendable wand 12 further includes a sprayer 30 at the second end 18 of the extendable wand 12 and connected to the second telescoping end 34 of

the telescoping tubes 24. The pressurized fluid in the cleaning fluid delivery system 14 is sprayed out of the sprayer 30 in order to clean with the cleaning device 10.

[0046] The illustrated handle 26 (Fig. 5) is connected to the cleaning fluid reservoir 20 and includes the pump 28 that forces the cleaning fluid from the cleaning fluid reservoir 20 to the second end 18 of the extendable wand 12. The handle 26 comprises a main body 36 connected at a first end to the cleaning fluid reservoir 20 and at a second end to the first telescoping end 32 of the pair of telescoping tubes 24. The handle 26 includes a bottle connector 38 for connecting the main body 36 to the cleaning fluid reservoir 20.

[0047] In the illustrated example, the main body 36 (Figs. 6 and 7) houses the pump 28 and connects the cleaning fluid reservoir 20 to the pump 28. The main body 36 includes a substantially cylindrical shell 40 having a longitudinal bore 42 extending therethrough. The bore 42 in the shell 40 defines a rear section 44, a handle receiving section 46 and a front section 48. The rear section 44 of the bore 42 includes a pair of parallel grooves 50 (Fig. 7A) adjacent the rear of the shell 40 to assist in connecting the pump 28 to the handle 26. An inwardly extending annular rib 52 defines a transition between the rear section 44 and the handle receiving section 46 of the bore 42. The handle receiving section 46 of the bore 42 includes a top opening 54 and a bottom opening 56 extending through the shell 40 for allowing a pump handle 58 of the pump 28 to extend therethrough. The shell 40 of the main body 36 includes a rear grip portion 60 for accepting a hand of a user of the cleaning device 10 thereon. At the front of the rear grip portion 60, the shell 40 also includes a substantially U-shaped flange 62 having a pair of aligned holes 64 for connecting the pump handle 58 to the main body 36. The front of the shell 40 defines an outside cylindrical surface 66 for connecting the pair of telescoping tubes 24 to the handle 26. In the illustrated example, the pump 28 is substantially located within the bore 42 of the main body 36.

[0048] The illustrated pump 28 of the cleaning fluid delivery system 14 forces the cleaning fluid from the cleaning fluid reservoir 20 to the second end 18 of the extendable wand 12. In the illustrated embodiment, the pump 28 includes a siphon tube 68 extending into the cleaning fluid reservoir 20, a valve insert sleeve 70, a first valve ball 72, a valve insert 74, a seal 76, a seal adapter 78, a second valve ball 80, the pump handle 58 and a spring 82. The pump handle 58 is compressed against the force of the spring 82 to move the seal 76 and seal adapter 78

relative to the valve insert 74 and the valve insert sleeve 70 to force the cleaning fluid out of the cleaning fluid reservoir 20 and to the second end 18 of the extendable wand 12.

[0049] In the illustrated example, the pump handle 58 (Fig. 8) is pumped to force the cleaning fluid in the cleaning fluid reservoir 20 to the second end 18 of the extendable wand 12. The pump handle 58 is substantially L-shaped and includes a connection portion 84 and a laterally extending grip 86. The connection portion 84 includes an enlarged section 88 with a slot 90 therethrough and a pair of pins 92. The enlarged section 88 is configured to accept the seal adapter 78 within the slot 90. As discussed in more detail below, the enlarged section 88 includes a pair of channels 94 for engaging the seal adapter 78 and moving the seal adapter 78. The pump handle 58 is connected to the main body 36 of the handle 26 by inserting the pair of pins 92 into the pair of aligned holes 64 in the substantially U-shaped flange 62 of the shell 40 of the main body 36, such that the connection portion 84 extends out of the top opening 54 in the main body 36 and the grip 86 extends out of the bottom opening 56 of the handle receiving section 46 of the bore 42 in the main body 36.

[0050] In an embodiment of the present invention, the siphon tube 68, the valve insert sleeve 70, the first valve ball 72, the valve insert 74, the seal 76, the second valve ball 80 and the seal adapter 78 of the pump 28 are aligned in the handle 26, with the siphon tube 68 extending into the cleaning fluid reservoir 20. The siphon tube 68 (Fig. 4A) includes a hollow cylinder 96 extending a length of the cleaning fluid reservoir 20 and an enlarged end 98 at a bottom of the cleaning fluid reservoir 20. The cleaning fluid in the cleaning fluid reservoir 20 is sucked up into the siphon tube 68 through the enlarged end 98. An end of the siphon tube 68 opposite the enlarged end 98 is connected to the valve insert sleeve 70 for delivering the cleaning fluid sucked up into the siphon tube 68 to the valve insert sleeve 70.

[0051] In the illustrated example, the valve insert sleeve 70 (Figs. 9-10) is connected to the rear section 44 of bore 42 of the shell 40 of the main body 36, the siphon tube 68 and the valve insert 74. The valve insert sleeve 70 includes an outer cylindrical casing 100, a bullet-shaped inner connector 102 co-axially aligned with the outer cylindrical casing 100 and an annular ring 104 connecting the inner connector 102 to the cylindrical casing 100. The cylindrical casing 100 includes a plurality of aligned outer interference rings 106 and a rear abutment ring 108 to assist in connecting the valve insert sleeve 70 to the main body 36 of the handle 26.

The bullet-shaped inner connector 102 includes a rear connecting tube 110 extending rearward from the annular ring 104 and a forward stepped connecting tube 112 extending forward from the annular ring 104. The stepped connecting tube 112 includes a first step 114, a second step 116 and a third step 118, with the stepped connecting tube 112 having smaller inner and outer diameters from the first step 114 to the third step 118. In the illustrated embodiment, the valve insert sleeve 70 is connected to the siphon tube 68 by sliding the cylinder 96 of the siphon tube 68 into the rear connecting tube 110 of the valve insert sleeve 70. The forward stepped connecting tube 112 connects the valve insert sleeve 70 to the valve insert 74.

[0052] The illustrated valve insert 74 (Figs. 11-12) is connected to the valve insert sleeve 70 and interacts with the seal 76 to force the cleaning fluid through the pump 28. The valve insert 74 comprises a rearward extending small cylinder 120 and a forward extending large cylinder 122 connected to the small cylinder 120 by an annular flange 124. The rearward extending small cylinder 120 includes a stepped bore 126 having a larger bore section 128, a middle bore section 130, a ball valve section 132 and a smaller bore section 134. A first spring receiving section 137 is defined between an inner diameter of the forward extending large cylinder 122 and a portion of the rearward extending small cylinder 120. As discussed in more detail below, the first spring receiving portion 137 is configured to accept a first end of the spring 82 therein. The ball valve section 132 includes a plurality of angled fins 136 extending from a transition between the smaller bore section 134 and the ball valve section 132. The valve insert 74 is connected to the valve insert sleeve 70 by inserting the second step 116 and the third step 118 of the bullet-shaped inner connector 102 of the valve insert sleeve 70 into the rearward extending small cylinder 120 of the valve insert 74 until the end of the valve insert sleeve 70 opposite the abutment ring 108 of the valve insert sleeve 70 abuts against the annular flange 124 of the valve insert 74. As illustrated in Fig. 4A, the first valve ball 72 is positioned in the rearward extending small cylinder 120 of the valve insert 74 between the plurality of angled fins 136 in the ball valve section 132 of the rearward extending small cylinder 120 and the front of the bullet-shaped inner connector 102. The first valve ball 72 rests on the angled fins 136 and allows fluid to flow from the valve insert sleeve 70 to the valve insert 74. However, the first valve ball 72 will cover the third step 118 of the bullet-shaped inner connector 102 of the valve insert sleeve 70 if fluid attempts to move from the valve insert 74 to

the valve insert sleeve 70 through the stepped bore 126 of the rearward extending small cylinder 120. In the illustrated embodiment, the forward extending large cylinder 122 of the valve insert 70 is configured to allow the seal 76 to slide therein.

[0053] In the illustrated example, the seal 76 (Fig. 13) slides within the valve insert 70 to force the cleaning fluid through the pump 28. The seal 76 comprises an outer tube 138 with a flared end 140 and a concentric inner tube 142 connected at a stepped front end 144. The inner tube 142 includes an opening 146 therethrough with a constriction 148 at the stepped front end 144. The opening 146 includes a conical end 150 adjacent the constriction 148. The flared end 140 of the outer tube 138 of the seal 76 is configured to slide within the forward extending large cylinder 122 of the valve insert 70 to connect the seal 76 to the valve insert 70. A second spring receiving section 177 is located between the outer tube 138 and the concentric inner tube 142. The spring 82 extends between the seal 76 and the valve insert 74 and is located in the first spring receiving section 137 of the valve insert and the second spring receiving section 177 of the seal 76. The spring 82 biases the flared end 140 of the outer tube 138 of the seal 76 away from the smaller bore section 134 of the stepped bore 126 of the rearward extending small cylinder 120 of the valve insert 74. The seal 76 is also connected to the seal adapter 78.

[0054] The illustrated seal adapter 78 (Figs. 14-16) moves the seal 76 within the forward extending large cylinder 122 of the valve insert 70 as the pump handle 58 is depressed. In one embodiment, the seal adapter 78 comprises a cylindrical shell 152 and a front connector 154. The seal adapter 78 includes a central cavity 156 having a large opening 158, a transition section 160 and an outlet section 162. The central cavity 156 is configured to accept the outer tube 138 of the seal 76 therein for connecting the seal adapter 78 to the seal 76. As the seal 76 is inserted into the seal adapter 78, a tip 164 of the stepped front end 144 of the seal 76 extends into the large opening 158 of the seal central cavity 156 of the seal adapter 78. The transition section 160 of the central cavity 156 includes a plurality of angled fins 166 similar to the plurality of angled fins 136 of the valve insert 74. As illustrated in Fig. 4A, the second valve ball 80 is positioned in the conical end 150 of the seal 76 between the plurality of angled fins 166 in the transition section 160 of the central cavity 156 of the seal adapter 78 and the conical end 150 of the seal 76. The second valve ball 80 rests on the angled fins 166 and allows fluid to flow from the seal 76 to the seal adapter 78. However, the second valve ball 80 will cover

the constriction 148 of the opening 146 of the seal 76 if fluid attempts to move from the seal adapter 78 to the seal 76. In the illustrated embodiment, the forward extending large cylinder 122 includes a pair of oppositely extending C-shaped flanges 168. The C-shaped flanges 168 are inserted into the channels 94 in the enlarged section 88 of the pump handle 58 to move the seal adapter 78 and the seal 76 as the pump handle 58 is depressed. The front connector 154 of the seal adapter 78 includes a plurality of ridges 170 on an outside surface thereof.

[0055] In the illustrated example, the pump 28 is located in the handle 26 and assists in connecting the cleaning fluid reservoir 20 to the handle 26. In one embodiment, the pump 28 and handle 26 are constructed by connecting the valve insert sleeve 70, the first valve ball 72 and valve insert 74 as described above. Therefore, the bottle connector 38 is slid over the large cylinder 122 of the valve insert 74 and the outer cylindrical casing 100 of the valve insert sleeve 70 until the bottle connector 38 abuts against the abutment ring 108 of the valve insert sleeve 70. In the illustrated embodiment, the bottle connector 38 comprises a ring 172 having a threaded inside surface and a grooved outside surface 174 for assisting in rotating the bottle connector 38. After the bottle connector 38 is abutting the abutment ring 108, the valve insert sleeve 70, the first valve ball 72 and the valve insert 74 are slid into the rear section 44 of the bore 42 of the shell 40 of the main body 36 until the front of the large cylinder 122 of the valve insert 74 abuts against the rib 52 in the bore 42 of the shell 40 of the main body 36. When the valve insert sleeve 70, first valve ball 72 and valve insert 74 are fully inserted into the main body 36, the bottle connector 38 will be located between an end of the rear grip portion 60 of the shell 40 of the main body 36 and the abutment ring 108 of the valve insert sleeve 70. Furthermore, the interference rings 106 on the outer cylindrical casing 100 of the valve insert sleeve 74 will fit into the grooves 50 in the rear section 44 of the bore 42 in the shell 40 of the main body 36 to assist in maintaining the valve insert sleeve 70, first valve ball 72 and valve insert 74 in the main body 36. The bottle connector 38 is therefore ready for connection to the cleaning fluid reservoir 20.

[0056] In the illustrated embodiment, the cleaning fluid reservoir 20 comprises a bottle 176 having cleaning fluid therein. The bottle 176 includes a neck with an outside threaded portion adapted to be screwed into the bottle connector 38. The bottle 176 is connected to the handle 26 by inserting the siphon tube 68 into an opening of the bottle 176 and screwing the outside

threaded portion into the bottle connector 38. The cleaning fluid in the bottle 176 can be any fluid that can clean surfaces or any objects. The cleaning fluids that can be used by the cleaning device 10 include water, soap, cleaning fluid similar to windshield washing fluid used in vehicles or any other fluid. As described in more detail below, once the cleaning fluid reservoir 20 is connected to the handle 26, the pump 28 can pump the cleaning fluid therethrough.

[0057] In the illustrated example, the pair of telescoping tubes 24 (Fig. 4B) include the first telescoping end 32 connected to the handle 26 and the second telescoping end 34 connected to the sprayer 30. The pair of telescoping tubes 24 comprises an inner telescoping tube 178 and an outer telescoping tube 180. The outer telescoping tube 180 fits over the cylindrical surface 66 of the shell 40 of the main body 36 in an interference fit to connect the pair of telescoping tubes 24 to the main body 36. The inner telescoping tube 178 includes a locking device 182 connected to an end thereof opposite the sprayer 30 for locking a position of the inner telescoping tube 178 in the outer telescoping tube 180, thereby allowing the extendable wand 12 to move to the fully extended position, the fully retracted position or any position therebetween. The locking device 182 includes a cam member 184 having a cylinder 186 connected to the inner telescoping tube 178 in an interference fit and a ring 188 at the end of the cylinder 186 and the inner telescoping tube 178. The ring 188 includes a slot 190 having a cam 192 therein. As the inner telescoping tube 178 is rotated in the outer telescoping tube 180, the cam member 184 will also rotate, thereby pushing the cam 192 against an inner surface of the outer telescoping tube 180 to lock the relative positions of the inner telescoping tube 178 and the outer telescoping tube 180. In one embodiment, at least one of the slot 190 and the cam 192 are non-annular such that the cam 192 will be pushed against the inner surface of the outer telescoping tube 180. The cam member 184 and the cam 192 of the locking device 182 are well known to those skilled in the art. In an alternative embodiment, the locking device 182 could comprise an exterior locking device connected to the outer telescoping tube 180. The exterior locking device comprises a nut molded onto the outer telescoping tube 180 adapted to accept a screw therein that could be tightened to abut against an outer surface of the inner telescoping tube 178, thereby locking the relative positions of the inner telescoping tube 178 and the outer telescoping tube 180.

[0058] The illustrated cleaning fluid delivery system 14 further comprises a coiled tube 194 interconnected between the seal adapter 78 and the sprayer 30 for delivering the cleaning fluid from the pump 28 to the sprayer 30. The coiled tube 194 includes a first end 193 placed over the ridges 170 on the front connector 154 of the seal adapter 78 to connect the coiled tube 194 to the seal adapter 78. The coiled tube 194 also includes a second end 195 connected to the sprayer 30. The coiled tube 194 will uncoil as the extendable wand 12 is expanded in order to continuously supply the cleaning fluid to the sprayer 30.

[0059] In the illustrated example, sprayer 30 (Figs. 17-18) accepts the cleaning fluid delivered thereto from the coiled tube 194 of the cleaning fluid delivery system 14 and sprays the cleaning fluid out of the cleaning device 10. The sprayer 30 comprises a sprayer body 197, a

[0060] check valve 196 and a spray pattern adjuster knob 198. The sprayer body 197 includes an attaching portion 200 and a spraying portion 202. The attaching portion 200 is aligned with the pair of telescoping tubes 24 and includes a tubular section 204, a spraying section 206 and a threaded portion 208. The tubular section 204 connects the sprayer 30 to the pair of telescoping tubes 24 by inserting the tubular section 204 into an end of the inner telescoping tube 178 with an interference fit. The tubular section 204 includes a bore 210 (see Fig. 4C) for accepting the second end 195 of the coiled tube 194 therein for connecting the coiled tube 194 to the sprayer 30. The threaded portion 208 includes an outside thread 218 for connecting the cleaning head 22 to the sprayer 30. The spraying section 206 has the spraying portion 202 extending at an angle therefrom. As illustrated in Fig. 4C, the spraying portion 202 includes a hole 214 fluidly communicating with the bore 210 in the tubular section 204. The hole 214 of the spraying portion 202 includes a sprayer constriction 216 and is configured to accept the check valve 196 therein. The spraying portion 202 further includes an outside thread 212 for connection with the spray pattern adjuster knob 198.

[0061] The illustrated check valve 196 (Fig. 19) is located in the hole 214 of the spraying portion 202 of the sprayer 30 and assists in spraying the cleaning fluid out of the sprayer 30. The check valve 196 includes a rear plunger 220, a corrugated middle section 222 connected to the rear plunger 220 and a nozzle end 224 having a plurality of apertures 226 therethrough. The check valve 196 is inserted into the hole 214 of the spraying portion 202 of the sprayer 30 until the rear plunger 220 abuts the sprayer constriction 216 in the hole 214 of the spraying

portion 202. The reference numeral 196a (Fig. 19A) generally designates another embodiment of the present invention, having a second embodiment for the check valve. Since the second embodiment of the check valve 196a is similar to the previously described check valve 196, similar parts appearing in Fig. 19 and Fig. 19A, respectively, are represented by the same, corresponding reference number, except for the suffix "a" in the numerals of the latter. The check valve 196a is a four part valve and includes a seal 199 affixed to a pin 201 extending from the rear plunger 220a. Furthermore, instead of the corrugated middle section 222, the second embodiment of the check valve 196a includes a spring 203 that extends over a pin 205 at a rear section of the rear plunger 220a. The spring 203 biases the rear plunger 220a away from the nozzle end 224a. The check valve 196 is maintained in the hole 214 of the spraying portion 202 of the sprayer 30 by the spray pattern adjuster knob 198.

[0062] In the illustrated example, the spray pattern adjuster knob 198 (Fig. 20) is connected to the spraying portion 202 of the sprayer 30 and maintains the check valve 196 within the sprayer 30. The spray pattern adjuster knob 198 comprises a thimble-shaped cap 228 having an inside thread 230 and an end opening 232. The spray pattern adjuster knob 198 is screwed onto the outside thread 212 of the spraying portion 202 of the sprayer 30 to connect the spray pattern adjuster knob 198 to the sprayer 30. Once the spray pattern adjuster knob 198 is connected to the sprayer 30, the pump 28 can spray the cleaning fluid out of the sprayer 30.

[0063] The illustrated pump 28 sucks the cleaning fluid from the cleaning fluid reservoir 20 and pushes the cleaning fluid towards the second end 18 of the extendable wand 12. In order to work the pump 28, a user of the cleaning device 10 grabs the handle 26 about the rear grip portion 60 of the shell 40 of the main body 36 and moves the grip 86 of the pump handle 58 towards the shell 40 of the main body 36. As the grip 86 of the pump handle 58 is moved towards the shell 40 of the main body 36, the channels 94 in the enlarged section 88 of the pump handle 58 will engage the C-shaped flanges 168 of the seal adapter 78 and move the seal adapter 78 rearward. As the seal adapter 78 is moved rearward, the seal 76 is also moved rearward, thereby compressing the spring 82 between the first spring receiving section 137 of the valve insert 74 and the second spring receiving section 177 of the seal 76. As the seal 76 is moved rearward, the first valve ball 72 moves over the third step 118 to cover the third step 118 of the bullet-shaped inner connector 102 of the valve insert sleeve 70, thereby preventing

fluid from moving from the valve insert 74 to the valve insert sleeve 70 through the stepped bore 126 of the rearward extending small cylinder 120. Therefore, since the volume of space between the annular flange 124 of the valve insert 74 and the flared end 140 of the outer tube 138 of the seal 76 diminishes, the fluid in that space will be forced out of the seal 76, through the central cavity 156, large opening 158, transition section 160 and outlet section 162 of the seal adapter 76 and into the coiled tube 194.

[0064] After the cleaning fluid has entered the coiled tube 194 of the cleaning fluid delivery system 14, the coiled tube 194 will deliver the cleaning fluid to the sprayer 30. Accordingly, the cleaning fluid leaving the coiled tube 194 will enter the bore 210 of the tubular section 204 of the sprayer 30 and move towards the hole 214 in the spraying portion 202 of the sprayer 30. As the fluid enters the hole 214 in the sprayer portion 202, the force of the fluid going through the sprayer constriction 216 forces the rear plunger 220 of the check valve 196 away from the sprayer constriction 216 by compressing the corrugated middle section 222 of the check valve 196. Thereafter, the cleaning fluid will be sprayed out of the sprayer 30 by passing through the apertures 226 in the check valve 196 and out through the end opening 232 of the spray pattern adjuster knob 198. Tightening and loosening the spray pattern adjuster knob 198 will allow a user of the cleaning device 10 to adjust the spray pattern of the cleaning fluid being ejected out of the sprayer 30 as is well known to those skilled in the art.

[0065] Once the extendable wand 12 has sprayed the cleaning fluid in the cleaning fluid delivery system 14 out of the sprayer 30, the cleaning fluid delivery system 14 must reset for another spray of the cleaning fluid. After the pump handle 58 has been depressed and the cleaning fluid has been sprayed out of the sprayer 30, the rear plunger 220 will move back towards the sprayer constriction 216 because of the bias of the corrugated middle section 222 of the check valve 196. Furthermore, the spring 82 will force the seal 76 away from the valve insert 72, thereby creating a vacuum in the volume of space between the annular flange 124 of the valve insert 74 and the flared end 140 of the outer tube 138 of the seal 76, and thereby sucking cleaning fluid into this space from the cleaning fluid reservoir 20 through the siphon tube 68 and the valve insert sleeve 70 to release the vacuum pressure in the space. The extendable wand 12 is thereby ready to spray the cleaning fluid again.

[0066] With the cleaning device 10 of the present invention, the pressure of the cleaning fluid within the cleaning fluid delivery system 14 is independent of the extendable length of the extendable wand 12. Since the volume of space within the coiled tube 194 is constant, the volume will not increase or decrease as the cleaning device 10 is expanded between the fully extended position and the fully retracted position. Therefore, the pressure required to move the fluid through the cleaning fluid delivery system 14 will remain constant and a user of the cleaning device 10 will not have to exert any more force on the pump handle 58 as the cleaning device 10 is expanded between the fully extended position and the fully retracted position, thereby providing the user of the cleaning device 10 with an easy and constant spray of fluid out of the cleaning device 10 independent of the extendable length of the extendable wand 12.

[0067] In the illustrated example, extendable wand 12 includes the cleaning head 22 at the second end 18 thereof. In one embodiment, the cleaning head 22 (Fig. 17) includes a yoke 234 connected to the sprayer 30, a pivot 236 pivotally connected to the yoke 234, a mop head 238 pivotally connected to the pivot 236 and cloth retainers 240 for retaining a cloth 242 to the mop head 238. The cleaning head 22 allows the user of the cleaning device 10 to spray the cleaning fluid onto a surface and clean/scrub/clear the surface with the cleaning head 22.

[0068] The illustrated yoke 234 (Fig. 21) connects the cleaning head 22 to the sprayer 30. The yoke 234 is substantially Y-shaped and includes a base 244 and a pair of connecting arms 246. The base 244 includes a threaded bore 248 adapted to be screwed onto the threaded portion 208 of the sprayer 30 to connect the yoke 234 to the sprayer 30. Each connecting arm 246 includes a facing annular cavity 250. The pivot 236 is positioned between the connecting arms 246 to connect the yoke 234 to the pivot 236.

[0069] In the illustrated example, the pivot 236 (Fig. 22) connects the yoke 234 to the mop head 238. The pivot 236 comprises a substantially rectangular block 252 having a first pair of pins 254 extending from a first pair of opposite sides of the block 252 and a second pair of pins 256 extending from a second pair of opposite sides of the block 252, with the first pair of pins 254 and the second pair of pins 256 being substantially co-planar. The pivot 236 is connected to the yoke 234 by positioning the block 252 between the connecting arms 246 of the yoke 234 and inserting the first pair of pins 254 into the facing annular cavities 250 of the connecting arms 246. The second pair of pins 256 connects the pivot 236 to the mop head 238.

[0070] The illustrated mop head 238 (Figs. 23 and 24) is connected to the pivot 236 and is configured to support the cloth 242 for using the cleaning device 10 as a scrubber. The mop head 238 comprises a platform 258 having a pair of supporting arms 260 extending from a top surface 262 of the platform 258. The platform 258 includes the top surface 262 having four substantially trapezoidal shaped openings 264 therein and a depending skirt 266 depending from a periphery of the top surface 262. A bottom surface 268 of the platform 258 includes a plurality of parallel slats 270 for supporting the cloth 242. Each supporting arm 260 includes facing annular cavity 272 for accepting the second pair of pins 256 therein to connect the mop head 238 to the pivot 236. The substantially trapezoidal shaped openings 264 are configured to accept the cloth retainers 240 therein for connecting the cloth 242 to the mop head 238.

[0071] In the illustrated example, the cloth retainers 240 (Figs. 25-26) retain the cloth 242 on the mop head 238. The cloth retainers 240 are substantially trapezoidally shaped and include a top plate 274 and a depending retaining skirt 276. The cloth retainers 240 are preferably comprised of an elastomeric material. The top plate 274 of the cloth retainers 240 includes a set of slots 278 therein to allow the cloth retainer 240 to bend easily. The depending retaining skirt 276 includes a trapezoidal periphery 280, with each side including an interference rib 282. As best illustrated in Fig. 4C, the cloth 242 is connected to the mop head 238 by first wrapping the cloth 242 around the platform 258 of the mop head 238, wherein ends of the cloth 242 overlie the substantially trapezoidal shaped openings 264 in the top surface 262 of the platform 258 of the mop head 238. Thereafter, the cloth retainers 240 are inserted into the substantially trapezoidal shaped openings 264 in the top surface 262 of the platform 258 of the mop head 238, thereby pushing the ends of the cloth 242 into the substantially trapezoidal shaped openings 264 in the top surface 262 of the platform 258 of the mop head 238 and frictionally capturing the cloth 242 between the cloth retainers 240 and the top surface 262 of the mop head 238. Accordingly, a user of the cleaning device 10 can spray the cleaning fluid on a surface and wipe the surface with the cloth 242 on the mop head 238.

[0072] The reference numeral 22a (Fig. 27) generally designates another embodiment of the present invention, having a second embodiment for the cleaning head. The second embodiment of the cleaning head 22a comprises an ice scraper 284 configured to be substituted for the yoke 234, the pivot 236, the mop head 238, cloth retainers 240 and the cloth 242 of the

first embodiment of the cleaning head 22. The ice scraper 284 includes a rear portion 286 having an inside threaded opening 288 therein. The ice scraper 284 is connected to the sprayer 30 of the cleaning device 10 by screwing the threaded portion 208 of the sprayer 30 into the inside threaded opening 288. The ice scraper 284 also includes a beveled edge 290 opposite the inside threaded opening 288. Furthermore, the ice scraper 284 includes a plurality of parallel support flanges 292 extending from the ice scraper 284 for providing strength to the ice scraper 284. In use, the second embodiment of the cleaning head 22a is used by spraying a cleaning fluid, preferably a fluid similar to a windshield wiper cleaning fluid used in vehicle, onto a surface having ice thereon and then scraping the ice off of the surface with the beveled edge 290 of the ice scraper 284.

[0073] In the forgoing description, it will be readily appreciated by those skilled in the art that modifications may be made to the invention without departing from the concepts disclosed herein. For example, in alternative embodiments of the cleaning device, the cleaning fluid delivery system could deliver cleaning fluid from the cleaning fluid reservoir directly to the cleaning head for application to a surface, differently configured mechanical pumps could be employed, an electrical pump could be employed and/or a motorized pump could be employed. Furthermore, the mop head 238 could include a planar flange extending around the depending skirt 266 at a position opposite the top surface 262, with the planar flange having at least one of hook and loop type fasteners for connecting to the cloth 242. In such a modification, the cloth could comprise a microfiber pad for easily connecting to the at least one of hook and loop type fasteners of the planar flange. Such modifications are to be considered as included in the following claims, unless these claims by their language expressly state otherwise.